The miVac
Pressure Controller

User Manual

Issue 1 – May 2007

Part Number 04-6001

Contents

GENERAL **2**
1 Introduction **2**

2 Safety and Maintenance Notes **3**
2.1 Symbols 3
2.2 Safety 3
2.3 General Information 3

3 System Description and Options **3**
3.1 Scope of delivery and installation 3
3.2 Checking the delivery 3
3.3 Installing the system 4
3.4 Good procedural practice 6
3.5 Routine Checks 6
3.6 List of acceptable solvents 6
miVac Systems and Combustible Solvents 6
Genevac and the ATEX Directive 6

4 Operation **7**
4.1 Control panel 7
4.2 Calibration 7
4.3 Starting up 7
4.4 Operating modes of the Controller 8
4.5 Selection, display of operating modes 9
4.6 Setting / changing the control parameters at the controller 10
4.6.1 Setting the selected control parameters 10
4.6.2 Querying the set values 10
4.6.3 Changing the pressure during operation 10
4.6.4 Set minimum pressure 10
4.7 Venting the system 10

TECHNICAL DATA **11**
5 General **11**
Environment 11

6 EC Declaration of Conformity **12**

7 Safety **12**

8 Warranty Statement **14**

9 Contact information **14**

10 Disposal and Recycling **14**

These instructions are subject to change without notice. No part of these instructions may be reproduced in any form or be processed, duplicated or distributed by electronic or optical means without the written permission of Genevac Limited. All rights reserved. © Genevac Limited.

These operating instructions should be read fully before you use the miVac system. Keep them near the system for easy reference. Your attention is drawn in particular to Safety and Maintenance Notes.

GENERAL

1 Introduction

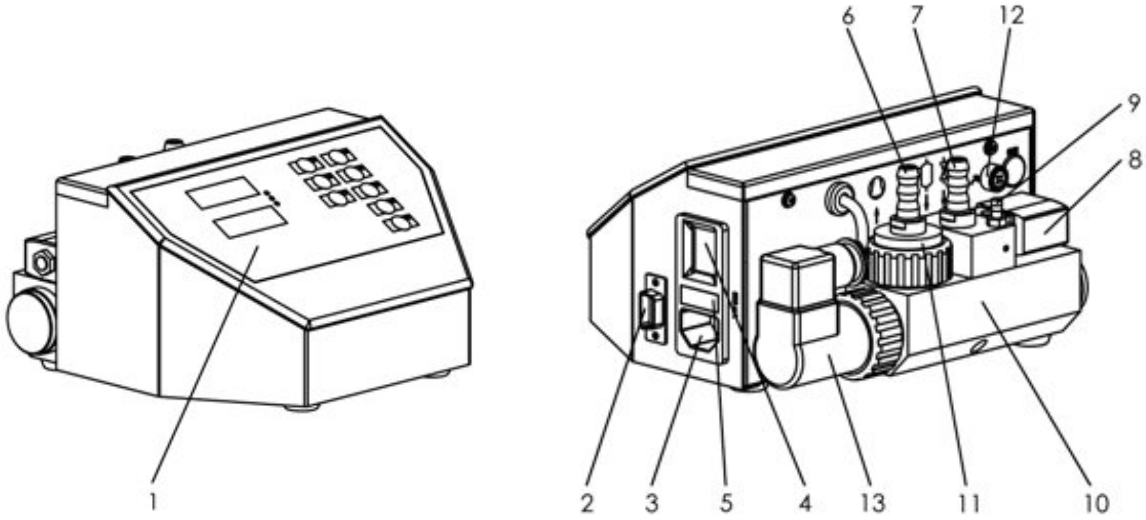
Drawing on extensive experience in the drug discovery field, the miVac Series is designed to provide very high performance coupled with ease of use, occupying the minimum of laboratory space.

The miVac Pressure Controller has been developed to improve both performance and Solvent recovery

Simple to use controls enable the control parameters to be set in an instant.

This manual will guide you through the start up requirements, set up needs and operation of the system to facilitate the most efficient procedure to protect your product's integrity and to ensure optimum performance at all times.

The Operating Manual must be kept at the place of use and be available to the personnel when required.



Item no.	Description	Item no.	Description
1	Controller complete	**8**	Ventilation valve
2	RS 232 – NOT USED	**9**	Inert gas connection
3	Power supply plug	**10**	Sensor integrated
4	Main switch Off / On	**11**	Check valve integrated
5	Fuse T 630 mA	**12**	NOT USED
6	Connection vacuum pump	**13**	Control valve
7	Connection vacuum apparatus		

2 Safety and Maintenance Notes

2.1 Symbols

The following safety symbols are used throughout this manual and can be found on the equipment. The definitions and scope of each symbol is as described below.

WARNING

THIS SYMBOL INDICATES HAZARDS THAT CAN LEAD TO SERIOUS MATERIAL DAMAGE OR POTENTIAL SERIOUS INJURY.

2.2 Safety

BEFORE OPERATING THE SYSTEM, IT IS IMPORTANT THAT THE FOLLOWING NOTES ARE READ TO ENSURE THAT THE IMPLICATIONS TO THE SAFETY OF PERSONNEL OPERATING THE SYSTEM AND FOR THE PROTECTION OF SAMPLE INTEGRITY ARE UNDERSTOOD.

The Pressure Controller may only be operated under the conditions stated:

- in the "Technical Data" section
- on the type plate
- in the technical specification for the order concerned
- The Pressure Controller is used in conjunction with a vacuum pump / vacuum system in industry, and in chemical and physical laboratories
- The applicable regulations must be observed when it is used with hazardous substances (corrosive, toxic, microbiological, radioactive or other hazardous substances).

2.3 General Information

When using the Pressure Controller in conjunction with miVac vacuum pumps or the miVac laboratory vacuum systems, the instructions in the operating manuals for this equipment must also be observed.

The controller of the Pressure Controller is maintenance-free. Valves should be cleaned whenever necessary.

2.4 Limitations of use

Your miVac Pressure Controller is **unsuitable** for use under the following circumstances:

- With strong acids such as HCl, TFA and HBr at all concentrations – See page 5 for approved list.

3 System Description and Options

3.1 Scope of delivery and installation

On delivery, it is advisable to unpack your system at the point of receipt, to ease the movement of the component parts to the point of use. It would be advisable to retain the packaging as Genevac and its Distributors will only accept returns in the original packaging.

3.2 Checking the delivery

Check the contents of the delivery as soon as possible against the delivery note and notify your Distributor immediately of any missing or damaged parts. Refer to http://www.mivac.co.uk/contact/distributors.html for up to date contact details.

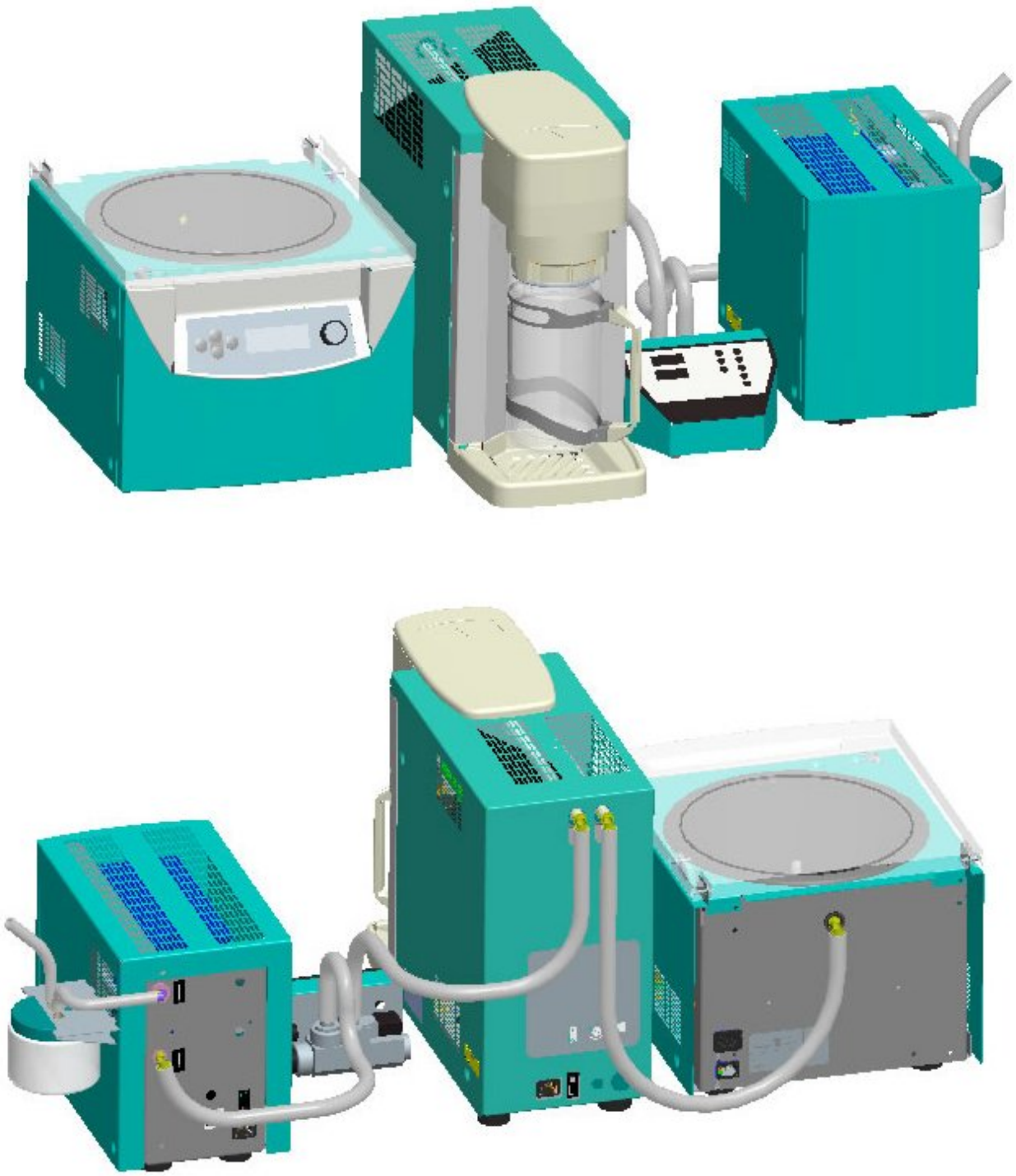
Keep the packaging in a safe place so that it can be used when sending the controller to the manufacturer's works or to an authorized workshop for maintenance or repair.

3.3 Installing the system

The Pressure Controller must be installed according to the labelling attached. The relevant safety instructions must be observed. When mounting the miVac Pressure Controller, ensure that it has a clearance of about 5 cm from surrounding surfaces. At the same time, ensure that there is adequate ventilation.

Use pre-assembled cables supplied. Using them excludes the possibility of faulty connections. All the vacuum lines and connections of the entire system must be checked for leaks before beginning work.

Below is an example of the Duo Concentrator, SpeedTrap and Duo Pump positioned on a bench, complete with Pressure Controller.



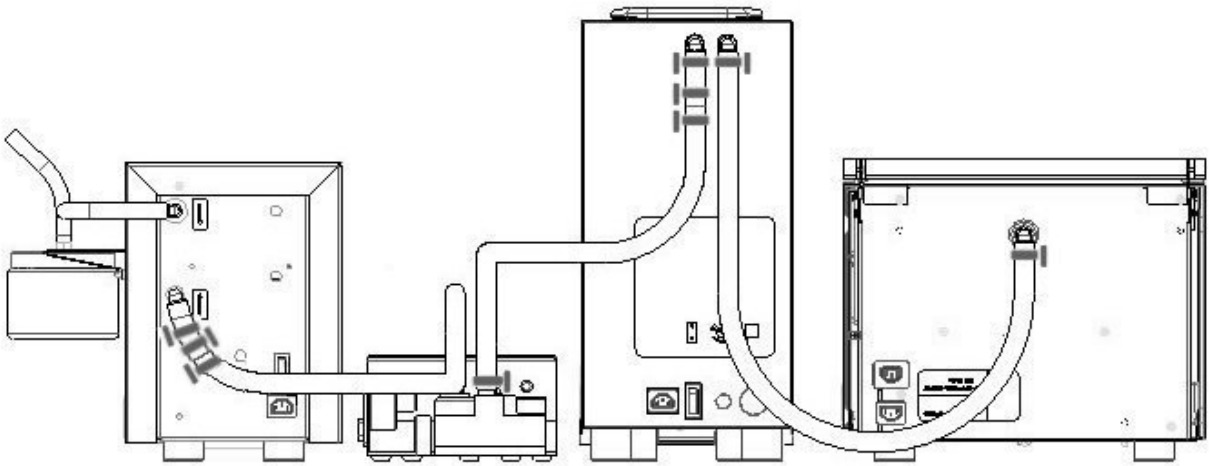
The Connection Kit supplied consists of the following:

1/2” Hose - 55mm long x 2
3/8” Hose – 1m long x 2
33mm Hose Clips x 2
25mm Hose Clips x 4
1/2”- 3/8” Reducer x 2
Electrical Cable

HOSES AND FITTINGS

Follow the diagram below to connect the units together using the 1/2” & 3/8” Vac hose cut to length using the hose cutter supplied in the miVac Connection Kit and the 1/2”-3/8” Hose Couplings.

Secure hoses with hose clips as indicated.



CABLES

Once you have fitted the hoses and adapters, you then need to connect the electrical supply cable.

3.4 Good procedural practice

A few general rules for safe operation of a system:

- Ensure only users familiar with all the issues outlined in this document are permitted to operate the equipment.
- Do not place any objects on top of any of the system components during a run

3.5 Routine Checks:

- Check all hose joints on a regular basis to ensure that they are secure.
- Clean the exterior paintwork with a soft, lint free cloth using one of the following:

  Detergent solution - e.g. fairy liquid
  Bleach solution (if using biological agents)
  Methanol
  Ethanol

3.6 List of acceptable solvents

Acetic Acid	**1,2-Dichloroethane**	**Methyl Tertiary Butyl Ether**
Acetonitrile (ACN)	**Dioxane**	**Methylene Chloride (DCM)**
Acetone	**Ethanol (EtOH)**	**Propan-1-ol or Propanol**
Ammonium Hydroxide (NH3OH)	**Ethyl Acetate**	**Propan-2-ol or isopropyl**
Butan-1-ol	**Formic Acid**	**alcohol (IPA)**
Butan-2-ol	**Heptane**	**THF**
Butyl Acetate	**Hexane (Hex)**	**Toluene**
Chloroform (TCM)	**Methanol (MeOH)**	**Water**

SOLVENTS IN RED CAN ONLY BE USED IN COMPLETE SYSTEMS WHERE ALL UNITS (CONCENTRATOR, SPEEDTRAP AND PUMP) HAVE A DATE OF APRIL 2007 OR LATER ON THE SERIAL PLATE.

miVac Systems and Combustible Solvents:

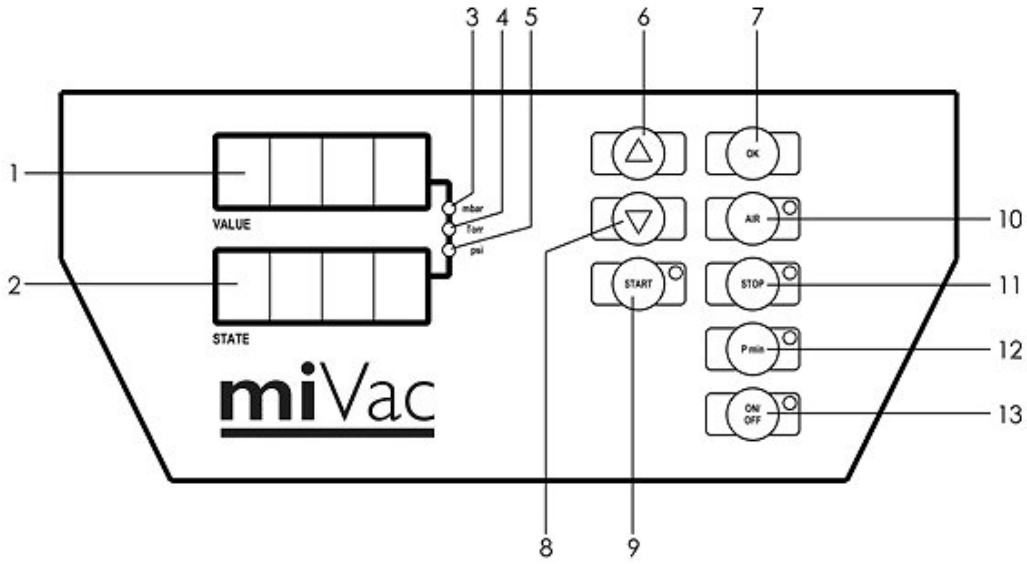
Please note it remains the responsibility of the user to consider safety when evaporating any combustible solvents and ensure the system is placed in a well ventilated environment.

Genevac and the ATEX Directive:
This Statement is applicable only to Member Countries of the EU.

Please note that it remains the responsibility of the user to consider any solvents being evaporated within the context of the ATEX directive. The presence of solvents on the list above indicates only that they will not damage the system. If further information is required, please contact your Sales Representative or visit http://www.miVac.co.uk

4 Operation

4.1 Control panel



1	VALUE:	VALUE: 4 digit 7 segment LED display – Pressure value, parameter value
2	STATE:	4 digit 7 segment LED display – Mode, operating mode, type of parameter
3	mbar:	Luminous spot = identification of the unit of measurement mbar *(factory setting)*
4	Torr:	Luminous spot = identification of the unit of measurement Torr
5	psi:	Luminous spot = identification of the unit of measurement psi
6	UP:	*arrow key* changes values upwards
7	OK:	setting level – selection of the parameters to be set – activation of the setting values Transfer of temporary values into the memory during operation.
8	DOWN:	*arrow key* changes values downwards
9	START:	activation of a procedure
10	AIR:	Venting – while button is pressed
11	STOP:	end of a procedure
12	P min	Reduction of the pressure to a minimum
13	ON/OFF	ON/OFF Switch

4.2 Calibration

The calibration menu enables long-term changes in the pressure sensor to be compensated for. Calibration should take place every six months or whenever displayed pressures cease to be plausible.

We recommend that the calibration be performed with a comparison measurement device. For this, the measured values: normal and low pressure must be input.

4.3 Starting up

The miVac Pressure Controller should be connected as shown on page 4.

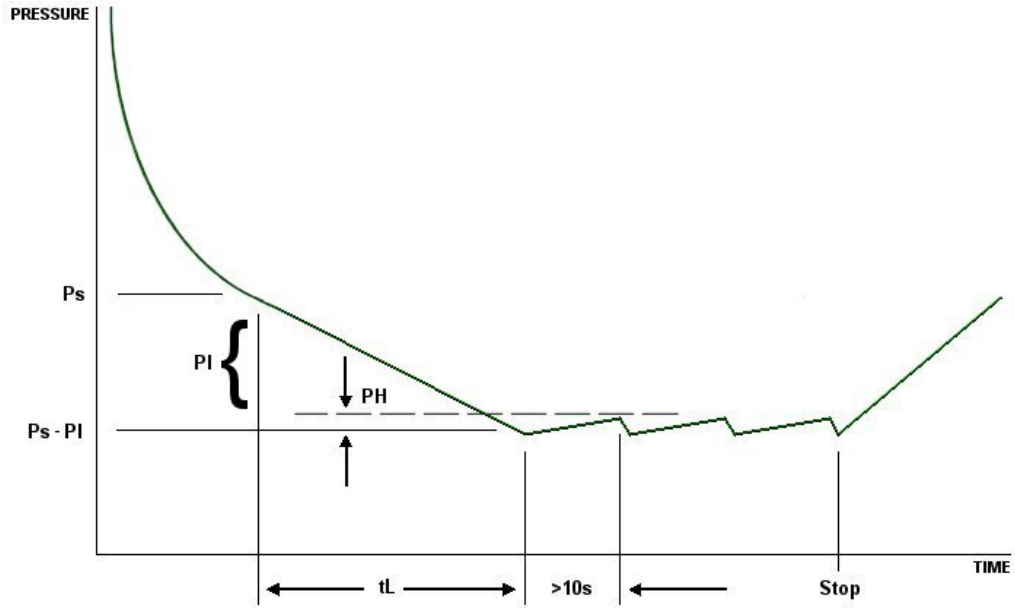
The MiVac Pressure Controller is switched on by the rocker switch **POWER** located on the device. The device is ready for operation after a short initializing routine, during which a beep sounds and all light elements light up briefly.

4.4 Operating modes of the Controller

Mode 1	**Manual mode**
	Lowering the working pressure until the set pressure has been attained and held constant. After switching on the power supply to the vacuum pump and controller, and selecting mode 1, the process is started by pressing the start button. The pressure is reduced to the set pressure value **Ps** (mbar)*, see Setting Control Parameters. The hysteresis value **PH** (mbar), which has to be previously set, determines the pressure increase after which the pressure is reduced again. In this way, the pressure is held constant by two defined threshold values (set value, hysteresis). This control procedure is repeated until the operator terminates operation (**STOP** key). The concentrator may be ventilated by pressing the **AIR** key. The set value may also be changed during operation in manual mode by means of (↑,↓). This set value is not stored, so the set value present at program start is retained. *(see chapter 6.3.5)* "ecoflex" pump models work directly at the set pressure value. It is not necessary to set the hysteresis **PH**.
Mode 2	**Manual mode with settable pressure reduction – see opposite**
	As in operating mode 1, but with an additional function for adapting the vacuum for processes in which the boiling point shifts (reduction of the concentration of the volatile component). **Reduces the risk of bumping by reducing the pressure slowly to the required final value.** After attaining the set pressure value **Ps**, there is a further pressure reduction corresponding to the set pressure value **PL** (1...1000 mbar) and a time **tL** (1...240 min)** which has to be defined previously. The maximum rate of change of pressure is limited to 1 mbar/s.
Mode 5	**Automatic operation – see opposite**
	Lowering the working pressure until a boiling point is found automatically (also with mixtures). In the automatic operating modes, the controller continuously checks the course of the pumping out curve (pressure change per unit time). It interprets significant deviations in the slope as the start of vapour formation and defines this pressure point as a set value. That is, the controller treats the value found in this way from now on in the same way as the set value in the previous modes. The sensitivity of the controller can be set with parameter **PA** (a higher **PA** value for volatile substances and a lower **PA** value for non-volatile substances. See Setting Control Parameters. After finding the pressure point **Ps**, the controller carries on working in mode 1. In the case of certain solvent mixtures or deeply cooled condensates, the optimal boiling point is not always found. In such cases, the distillation process may be further optimised by repeating with changed **PA** values. Maximum distillation speed can be achieved in this way, taking into account the cooler capacity and the stability of the vaporization process (no frothing of the distillate). Genevac recommends starting with a **PA** value of 10 for a Quattro Concentrator and a **PA** value of 40 for a Duo Concentrator.
Mode 6	**Automatic operation with settable pressure reduction – see opposite**
	As operating mode 5, and after the boiling point has been found, causes a further lowering of the working pressure corresponding to the set pressure value PL (mbar) and tL (min) .**

* Corresponds to the set unit of measurement: mbar, Torr, psi
** tL is displayed on the control panel in minutes

Mode 2 – Example of pressure control



Example: If **Ps** = 30 and **PI** = 10 then the Final Pressure = 20

Modes 5 and 6 – Discussion

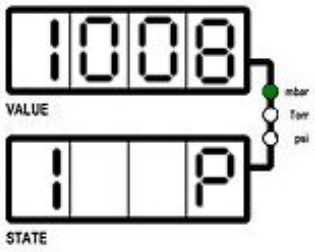
Mode 5 allows the controller to spot the onset of boiling and sets **Ps** accordingly. If this mode is used then solvent recovery will be maximised but at the expense of speed.

Probably a better method to use is Mode 6 where you can specify the further reduction in pressure **PL** after the controller determines boiling point. Dropping the pressure below boiling point by **PL** will cause the solvent to cool and increase the evaporation rate.

Some experimentation will be required in order to determine the optimum settings for your particular application. We have provided a “Notes” page at the back of this manual for this reason.

4.5 Selection, display of operating modes

After switching on, the desired operating mode can be set with the cursor keys ↑ **UP** and ↓ **DOWN**.



The current operating mode appears in the first position of the display and is activated with the **START** key (a "**-**" appears in the second position of the display).

The **STOP** key terminates the operating mode ("**-**" disappears) and the control is thus disabled.

The current control parameters can be brought into the display while the program is running without interrupting the control sequence by pressing the **START** key for 3 seconds.

The code letter of the currently selected parameter appears in the **STATE** display field and its associated value in the **VALUE** display field.

4.6 Setting / changing the control parameters at the controller

The configuration menu is used to set the control parameters. It may only be entered when the control is inactive (control interrupted with the STOP key).
Press the **OK** button for three seconds. The mode code in the **VALUE** display field changes to **P**. Select the setting parameter with the ↑ **UP** and ↓ **DOWN** buttons *(see table below).*

Only those parameters which have to be set for the selected mode are displayed. Key to the code letters:

C	**Pressure sensor calibration**		
CH	<de>	at normal pressure (**H**igh)	Set this last
CL	<de>	at low pressure (**L**ow) (at lowest possible pressure, e.g. 10 mbar)	Set this first
P	**Pressure settings in (<de> = set pressure unit mbar, torr or psi)**		
PS	<de>	**S**et value	Modes 1, 2,
PH	<de>	**H**ysteresis	Modes 1, 2, 5, 6
PL	<de>	Amount of pressure reduction (**L**ow pressure)	Modes 2, 6
PA	<de>/min	threshold value for detecting the boiling point **a**utomatic mode	Modes 5, 6
t	**Time setting**		
tL	min	Time for the pressure reduction (**L**ow pressure)	Modes 2, 6
tH	min	NO FUNCTION	Modes 1, 2, 5, 6
F	**Frequency reduction in %, starting from the maximum operating frequency**		
FA	%	INFO ONLY – NOT APPLICABLE	Modes 5, 6

After selecting the parameter, confirm it with **OK**.
This display changes to "**E**".
Set the desired value with the↑ **UP** and↓ **DOWN** keys, confirm with **OK**, and repeat with the other required parameters if necessary.
Press the **STOP** key to leave the setting menu.
The set values are stored after the setting menu has been left.

4.6.1 Setting the selected control parameters

During operation, the current pressure value (mbar) is shown in the **VALUE** display field, there is a "**P**" in the **STATE** display field.

4.6.2 Querying the set values

The set values can be displayed during operation by repeatedly pressing the START button.

4.6.3 Changing the pressure during operation

The set value can be changed at any time by pressing the **UP** and **DOWN** keys. The display changes from "**P**" to "**S**" during the setting. This set value is temporarily active. After pressing the "**STOP**" button, the originally stored set value becomes active once more.

If this iteratively determined set value is to be permanently transferred into the memory, this may be done by pressing the **OK** key once.

4.6.4 Set minimum pressure

By pressing the $\mathbf{P_{min}}$ button, the diaphragm pump is switched to continuous operation and the vacuum valve remains open until the minimum attainable pressure is achieved . The attainable minimum pressure stabilizes after an adequate waiting time.

4.7 Venting the system

The system may be vented by pressing the **AIR** key at any time. However, it must be noted that this also ends the search run in automatic mode.
Venting is intermittent while the controller is active. That is venting takes place only as long as **AIR** is kept pressed. When the controller is inactive, pressing **AIR** completely vents the system.

TECHNICAL DATA

5 General

Sensor	integrated	
Sensor type	ceramic sensor	
Measuring range	1 - 1100	mbar
Measuring uncertainty	±2; FS	mbar
Controller		
Sensor interface	3 conductor interface	
Scan frequency	10	Hz
Resolution ADC	12	Bit
Power supply	+ 5 stabilized	V
Sensor signal	0.5 to 4.5 *(optionally also 0..5 V or 4..20 mA possible)*	V
Pressure indicator	digital; red, 9 mm high digits in mbar, torr or psi	
Switching accuracy/ control accuracy	±1	digit
Communication interfaces	NOT AVAILABLE	
Power consumption		
Controller		
in normal operation	max. 20 *(depends upon the control power)*	W
Fuse (internal controller)	5	A
Power pack	internal	
Operating voltage	90 .. 264	V AC
Operating frequency	50 / 60	Hz
Output voltage	24	V DC
Output current	1.25	A
Output power	30	W
Entire unit		
Protective system	IP 20	
Working temperature	15 - 40	°C
Device fuse	T 0.630	A
Dimensions (W/D/H)	195 / 178 / 105	mm
Weight	1.6	kg
Connectors on the casing		
IN/OUT: RS 232	NOT AVAILABLE	
OUT: Control valve	Control valve integrated	
OUT: Water valve	NOT AVAILABLE	
inert gas	Hose nozzle DN 4	
vacuum apparatus	Hose nozzle DN 8	
vacuum pump	Hose nozzle DN 8	
Other components		
Check valve	integrated	

Environment:

The following figures apply:

	Operating	Storage
Ambient Temperature:	0°C to 30°C	5°C to 40°C
Relative Humidity:	0 – 95%	0 – 90%
Altitude:	Sea Level to 1,600m	Sea Level to 12,000m

6 EC Declaration of Conformity

The miVac Pressure Controller conform to the following directives:

73/23/EU	Low Voltage Directive
98/37/EU	Machinery Directive
89/336/EU	Electromagnetic Compatibility Directive

The miVac Pressure Controller fulfils the following product standards:

BS EN 61010-1	Safety requirements for electrical equipment for measurement, control, or laboratory use.
BS EN 60204-1	Electrical equipment of machines
BS EN 50110-1 (DIN VDE 0105-100)	Operation of electrical installations
BS EN 292-1 and 292-2	Safety of machines, devices and plants

The CE sign is located on the rating plate.

When fitting the controller into a system (vacuum apparatus), it must be ensured that the system conforms to these directives before starting it up.

Observe the binding national, local and plant-specific regulations.

7 Safety

WARNING!

THIS SYSTEM MUST BE EARTHED

THIS SYSTEM IS A SAFETY CLASS 1 PRODUCT ACCORDING TO IEC CLASSIFICATION. IT MUST NEVER BE USED WITH ANY INTERRUPTION TO THE SAFETY EARTH CONDUCTOR. IT IS AN INSTALLATION CATEGORY II PRODUCT AND IS INTENDED TO OPERATE FROM A NORMAL SINGLE-PHASE SUPPLY.

THIS SYSTEM HAS BEEN DESIGNED TO BE USED IN A POLLUTION DEGREE 1 ENVIRONMENT (NO POLLUTION, OR ONLY DRY NON-CONDUCTIVE POLLUTION).

ANY MAINTENANCE OR REPAIR OF THIS PRODUCT SHALL BE CARRIED OUT BY GENEVAC PERSONNEL (OR APPROVED REPRESENTATIVES OF GENEVAC) USING ONLY APPROVED SPARE PARTS.

NOTES

Genevac Limited
The Sovereign Centre
Farthing Road
Ipswich
IP1 5AP
United Kingdom

Sales and Service Hotlines

Service Hotline: +44 (0) 1473 243000

Sales Hotline: +44 (0) 1473 240000

Fax: +44 (0) 1473 461176

Email: salesinfo@genevac.co.uk

Web site: www.miVac.co.uk

Genevac Inc
707 Executive Boulevard
Suite D
Valley Cottage
New York
10989
United States of America

Sales and Service Hotline

(1) 845 267 2211

Fax (1) 845 267 2212

Email: salesinfo@genevacusa.com

For main Distributor listing, visit:

www.mivac.co.uk/contact/distributors.html

8 Warranty Statement

This product is guaranteed for period of 12 months from the date of delivery to site. In the unlikely event of any defect arising due to faulty materials or construction resulting in system failure, the unit will be repaired free of charge. This to include all labour and component costs incurred.

This warranty is subject to the following provisions:

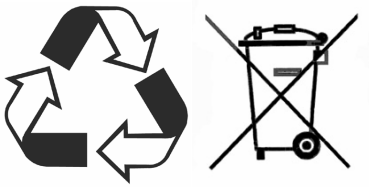
1. System must be sited, installed and operated in accordance with User Manual.
2. Unit only used for the purpose it was sold, and in accordance with Genevac published compatible solvent list.
3. Regular cleaning and preventative maintenance schedule to be adhered to as detailed in User Manual. See item 3.5 Routine Checks on Page 6.
4. Warranty does not cover accidental damage, misuse, modifications or inappropriate repair by untrained personnel.
5. Warranty does not cover consumable items.

Failure to adhere to the above would invalidate the warranty and result in the costs of repairs being charged.

9 Contact information

See opposite; please ensure that you have the serial numbers at hand for the components of your system.

10 Disposal and Recycling



The miVac product should not be discarded in your regular disposal stream. Contact your Distributor or Genevac for proper disposal instructions.

Within the EU, it is Genevac's responsibility under the WEEE directive to provide for the recycling of their products.